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BERKELEY - CALIFORNIA

RESEARCH NOTE

No. 188

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CALIFORNIA CONE CROP—1961[1/]

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Poor cone crops are prevalent on nearly all species of forest trees this year over most of the state. However, there are indications that the cones are late in developing and are harder to see, thus making it likely to underestimate the crop. Collection may have to be deferred until later than usual to allow the cones to ripen.

In addition to low cone production there are some losses to forest pests. Insects have been reported in heavy concentration on Douglas-fir cones in the north coast area and on sugar pine in the southern Sierras. A late, severe frost in the upper Sacramento drainage may have injured cones also.

Of the major conifers, only sugar pine, Douglas-fir, red fir, white fir, and redwood had even scattered crops of medium to heavy size, according to a summary of field reports submitted by members of the California Division of Forestry, U.S. National Forest Administration, and the Pacific Southwest Forest and Range Experiment Station.

The reports were based on ocular estimates of the cone crops on stands of timber in various localities throughout the state. The California Division of Forestry used the system devised in Oregon[2/]:

1. None--no cones on any trees or few cones on occasional trees.

2. Very light--few cones on 25 percent of the trees, or few cones on 25 percent of the trees and many cones on occasional trees.

1/ In cooperation with the California Division of Forestry and Region 5, U.S. Forest Service.

2/ Engstrom, W. H. Oregon cone crop, 1954. Oregon State Board of Forestry Res. Note 16, 7 pp.

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3. Light--few cones on 75 percent of the trees, or many cones on some trees and few cones on 75 percent of the trees.

4. Medium--some cones on all trees, or many cones on less than 75 percent of the trees.

5. Heavy--many cones on 75 percent of the trees and some cones on all trees, or many cones on all trees.

The Oregon system applies to all trees, regardless of size. This has led to some confusion in rating California cone crops, as Fowells and Schubert[3/] have shown that most of the cones are borne on dominant and codominant trees. Therefore, The Experiment Station and Region 5 of the U.S. Forest Service cooperated in devising another rating system last year. In this system, only seed trees (dominant trees over 12 inches d.b.h., with a full crown) were rated. Five categories are used here also:

1. None--no cones on any seed trees.

2. Very light--few cones on less than one-fourth of the seed trees.

3. Light--few cones on more than one-fourth of the seed trees.

4. Medium--many cones on one-fourth to one-half of the seed trees.

5. Heavy--many cones on more than half of the seed trees.

To rate individual trees, the following index adapted from one devised by Fowells and Schubert[3/] may be helpful:

Cone crop rating		Ponderosa pine Jeffrey pine Douglas-fir	Sugar pine White fir Red fir
None		0	0
Light	"few"	1-20	1-10
Medium	"few"	21-80	11-40
Heavy	"many"	81-160	41-80
Very heavy	"many"	161 +	81 +

In this report the cone crop reports have been summarized according to the forest tree seed collection zones described by Fowells[4/]. A map of these zones is appended to this note. Since the cone crop varies

3/ Fowells, H. A., and Schubert, G. H. Seed crops of forest trees in the pine region of California. U.S. Dept. Agr. Tech. Bul. 1150, 48 pp., illus. 1956.

4/ Fowells, H. A. Forest tree seed collection zones in California. U.S. Forest Service, Calif. Forest and Range Expt. Sta. Res. Note 51, 5 pp., illus. 1946.

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widely within zones, it is advisable to consult field offices of the California Division of Forestry, or the U.S. Forest Service to determine cone crop locations.

Of the major species of forest trees, the cone crop reports were distributed as follows:

Species	Crop rating					Number of reports
	1	2	3	4	5	
	(Percent of reports)					
Ponderosa pine	35	55	10	0	0	105
Jeffrey pine	60	35	5	0	0	93
Sugar pine	30	40	15	10	5	128
Douglas-fir	25	50	15	9	1	102
Red fir	35	40	10	10	5	84
White fir	50	30	15	4	1	131
Incense-cedar	60	30	10	0	0	110
Redwood	--	--	60	20	20	9
Giant sequoia	20	20	60	--	--	5

As an aid to collection, cone crops are also summarized by counties (Table 1). This is purely arbitrary, but permits subdivision of zones by means of lines which already have been delineated on most maps. It may be feasible to combine several counties or to redefine some seed zone boundaries in the near future.

Evaluation of 1960 Crop

Last year's seed production was generally good, as predicted. There were some losses to insects. A summary of insect damage to cones can be found on page 6 of "Forest Pest Conditions in California--1960," the official report of the California Forest Pest Control Action Council, published by the California Division of Forestry.

In general, the new forms used by the U.S. Forest Service served their purpose well. To be even more effective, a greater number of reports are needed. It is especially important to specify the locality of each report to permit plotting and summarization. The irregularity of seed crops and the increasing demands for tree seed emphasizes the need for a comprehensive survey of the available crop each year. Comments are invited on either the method of reporting cone crops (rating system and form) or the seed collection areas (seed zones).

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1961

Major species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
Ponderosa pine (Pinus ponderosa)	I	1.1	13	Lassen - 1.3
	II	1.3	15	Butte, Nevada, Sierra - 1.5
	III	1.5	22	Amador, Shasta - 2.0 Nevada - 1.7 Placer, Sierra - 1.5 Plumas - 1.3
	IV	1.7	21	Calaveras, Tuolumne - 1.8 Fresno - 1.7 Madera, Mariposa - 1.3
	V	1.8	28	Tuolumne - 2.1 Fresno - 1.7 Tulare - 1.3
	IX	2.0	2	Santa Barbara - 3.0
	X	1.8	26	Glenn, Mendocino, Shasta, Trinity - 2.0 Siskiyou - 1.8 Lake - 1.5
	XI	1.0	6	--
	XIII	2.0	1	Santa Cruz
Jeffrey pine (Pinus jeffreyi)	I	1.8	9	Nevada, Placer, Plumas, Shasta, Siskiyou - 2.0
	III	1.2	17	Amador - 1.5; Shasta - 1.3; Plumas - 1.2
	IV	1.3	7	Tuolumne - 1.4
	V	1.8	23	Tuolumne - 2.1; Tulare - 1.7; Madera - 1.3
	VI	1.0	2	--
	VII	1.0	6	--
	VIII	1.4	12	Fresno - 2.0; Tuolumne - 1.7; Alpine - 1.3
	IX	1.8	6	Ventura - 2.7
	X	1.5	8	Mendocino, Shasta - 2.0; Siskiyou - 1.2
	XI	2.0	2	Del Norte, Humboldt
Sugar pine (Pinus lambertiana)	I	1.4	7	Siskiyou - 2.5
	II	2.4	17	Nevada, Placer, Yuba - 3.0; Butte - 2.7 Shasta, Sierra, Tehama - 2.0; El Dorado - 1.7

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1961, continued

Major species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
Sugar pine, cont'd.	III	2.4	18	Nevada, Placer - 3.5; Amador, Sierra - 3.0 Plumas - 2.5; Shasta - 2.3; Siskiyou - 2.0
	IV	1.8	19	Mariposa - 2.5; Fresno - 2.0 Tuolumne - 1.8; Madera - 1.5; Calaveras - 1.2
	V	2.6	30	Tuolumne - 3.2; Calaveras - 3.0; Fresno - 1.7; Madera - 1.5; Tulare - 1.3
	VII	2.5	4	Nevada, Placer, Sierra - 3.0
	X	1.8	25	Trinity - 2.5 Glenn, Shasta, Tehama - 2.0 Siskiyou - 1.7; Lake, Mendocino - 1.5
	XI	1.5	4	Humboldt - 3.0
	XIII	1.3	3	Mendocino - 1.5
Douglas-fir (Pseudotsuga menziesii)	I	1.7	6	Lassen, Shasta - 2.0; Siskiyou - 1.7
	II	2.0	16	Yuba - 3.0; Butte - 2.3 Nevada, Placer, Sierra, Tehama - 2.0
	III	1.7	16	Plumas - 2.7 Nevada, Placer, Sierra - 2.0; Shasta - 1.3
	IV	1.5	4	Tuolumne - 1.7
	V	2.3	9	Tuolumne - 2.5; Fresno, Mariposa - 2.0
	X	2.0	26	Siskiyou - 2.2., Glenn, Mendocino - 2.0; Lake, Trinity - 1.5
	XI	3.1	17	Trinity - 5.0 Del Norte, Siskiyou - 3.5 Humboldt, Mendocino - 2.5
	XII	2.3	3	Humboldt - 2.5; Del Norte - 2.0
	XIII	1.4	5	Santa Cruz - 2.0; Mendocino - 1.3

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1961, continued

Major species	Seed zone	Average rating[1/]	Number of reports	County-zone ratings[2/]
Incense-cedar (Libocedrus decurrens)	I	1.1	8	Siskiyou - 1.3
	II	1.5	11	Butte, Tehama, Yuba - 2.0
	III	1.4	12	Nevada, Placer, Sierra - 2.0; Plumas - 1.5; Shasta - 1.3
	IV	1.3	18	Fresno - 1.7; Tuolumne - 1.3; Calaveras - 1.2
	V	1.5	26	Fresno - 1.7; Tuolumne - 1.5
	VII	2.0	3	Nevada, Placer, Sierra - 2.0
	IX	1.0	3	--
	X	1.9	22	Siskiyou - 2.2; Glenn, Tehama - 2.0; Mendocino - 1.5; Shasta - 1.4
	XI	1.0	3	--
Red fir (Abies magnifica)	I	1.8	11	Siskiyou - 2.4; Shasta - 2.0; Lassen - 1.3
	III	1.5	16	Amador, Plumas - 2.0; Shasta - 1.7
	V	2.4	21	Tuolumne - 3.4; Tulare - 2.0; Fresno - 1.7; Madera - 1.5
	VII	2.1	9	Nevada - 3.0; Placer, Sierra - 2.0; El Dorado - 1.7
	VIII	2.0	11	Tuolumne - 3.3 Fresno, Mariposa, Tulare - 2.0 Madera - 1.5
	X	2.5	16	Siskiyou - 3.0 Glenn, Shasta, Trinity - 2.0 Mendocino - 1.5
White fir (Abies concolor)	I	1.6	10	Siskiyou - 2.2
	II	1.5	13	Yuba - 2.3; Butte - 1.7
	III	1.5	19	Amador - 2.5; Plumas - 1.8 Nevada, Placer - 1.5; Shasta - 1.3
	IV	1.7	18	Calaveras, Fresno, Madera - 2.0; Tuolumne - 1.6; Mariposa - 1.5
	V	1.9	27	Tuolumne - 2.1; Fresno - 2.0 Madera, Tulare - 1.7

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1961, continued

Major species	Seed zone	Average rating[1/]	Number of reports	County-zone ratings[2/]
White fir, cont'd.	VI	1.0	2	--
	VII	1.0	5	--
	VIII	1.5	11	Fresno, Tuolumne - 2.0
	IX	1.3	3	San Bernardino - 2.0
	X	2.2	20	Siskiyou - 2.5; Glenn, Tehama - 2.0; Mendocino - 1.5
	XI	1.0	3	--
Redwood (Sequoia sempervirens)	XII	3.5	5	Del Norte - 4.0; Humboldt - 3.0
	XIII	2.2	4	Humboldt - 2.3; Sonoma - 2.0
Giant sequoia (Sequoia gigantea)	IV	3.0	2	Calaveras
	V	2.0	3	Calaveras - 3.0, Tulare - 2.0

Minor species	Seed zone	Average rating[1/]	Number of reports	County-zone ratings[2/]
PINES:				
Lodgepole pine, or Beach pine (P. contorta)	I	1.6	8	Siskiyou - 2.5; Lassen, Shasta - 2.0
	III	2.0	7	Butte, Plumas, Shasta, Siskiyou, Tehama - 2.0
	V	1.8	12	Fresno - 2.0; Tuolumne - 1.9
	VII	1.1	7	Nevada - 1.5
	VIII	1.5	13	Tuolumne - 2.0
	XII	2.0	2	Del Norte, Humboldt - 2.0
	XIII	2.0	1	Mendocino - 2.0
Western white pine (P. monticola)	III	1.0	2	--
	IV	1.5	2	Tuolumne
	V	1.4	5	Tuolumne
	VI	1.0	1	--
	VII	2.2	5	Nevada, Placer, Sierra - 3.0
	VIII	1.7	7	Tuolumne - 2.3; Amador - 1.5
	X	3.0	1	Siskiyou
Coulter pine (P. coulteri)	IX	2.0	13	Ventura - 4.0; Riverside - 3.0
	XIII	3.5	2	Santa Clara - 3.0; Monterey - 4.0

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1961, continued

Minor species	Seed zone	Average rating 1/	Number of reports	County-zone ratings 2/
PINES, cont'd.:				
Knobcone pine (P. attenuata)	I	4.0	1	Siskiyou
	X	5.0	3	Siskiyou
Monterey pine (P. radiata)	XIII	4.0	1	Monterey
Bishop pine (P. muricata)	XII	2.0	2	Del Norte, Humboldt
	XIII	2.0	1	Mendocino
Whitebark pine (P. albicaulis)	VIII	1.5	2	Mono - 2.0
Foxtail pine (P. balfouriana)	X	4.0	1	Tehama
Digger pine (P. sabiniana)	IV	1.0	1	--
Single leaf pine (Pinyon) (P. monophylla)	VI	1.0	1	--
	VIII	1.0	1	--
OTHERS:				
Lowland white fir (Grand fir) (Abies grandis)	III	1.0	2	--
	XIII	1.0	1	--
Bristlecone fir (Santa Lucia fir) (Abies venusta)	IX	4.0	1	Monterey
Bigcone Douglas-fir (Pseudotsuga macrocarpa)	IX	1.3	4	Santa Barbara - 2.0
Mountain hemlock (Tsuga mertensiana)	VII	1.0	2	--
	VIII	2.0	4	Tuolumne - 3.0; Alpine - 2.0
Western juniper (Juniperus occidentalis)	VI	4.0	1	Mono
	VII	1.5	2	Alpine - 2.0
	VIII	2.6	8	Mono - 4.0; Tuolumne - 2.5 Alpine - 2.0

1/ Based on the numerical scale 1 = none, 2 = very light, 3 = light, 4 = medium, 5 = heavy.

2/ Only counties with reports higher than 1 are shown.

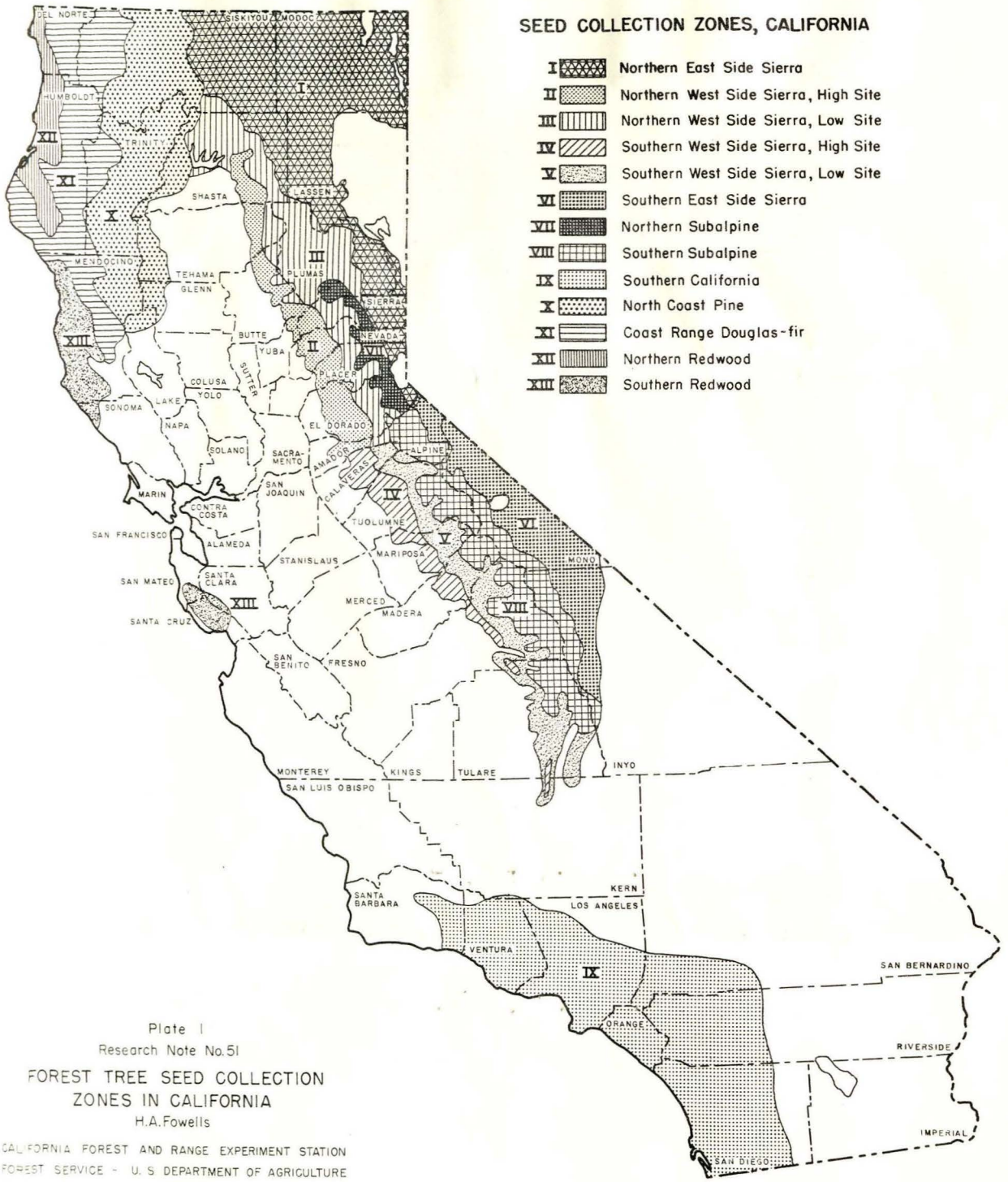

Plate I

Research Note No. 51

FOREST TREE SEED COLLECTION ZONES IN CALIFORNIA

H.A. Fowells

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